

CLAIMS

1. A gallium nitride-based semiconductor device having a p-type layer that is a gallium nitride (GaN) compound semiconductor layer containing a p-type impurity and exhibiting p-type conduction, wherein the p-type layer comprises a top portion and an inner portion located under the top portion, wherein the inner portion contains the p-type impurity and, in combination therewith, hydrogen and wherein the top portion includes a region containing a Group III element and a Group V element at a non-stoichiometric atomic ratio.
2. A gallium nitride-based semiconductor device according to claim 1, wherein the inner portion of the p-type layer has a percent thickness of 40% to 99.9% with respect to a thickness of the p-type layer.
3. A gallium nitride-based semiconductor device according to claim 1 or claim 2, wherein the inner portion of the p-type layer has a hydrogen concentration of  $1 \times 10^{18} \text{ cm}^{-3}$  or more and an impurity concentration of  $1 \times 10^{18} \text{ cm}^{-3}$  to  $1 \times 10^{21} \text{ cm}^{-3}$ .
4. A gallium nitride-based semiconductor device according to any one of claims 1 to 3, wherein the inner portion has a hydrogen concentration that is equal to, or lower than, an impurity concentration.

5. A gallium nitride-based semiconductor device according to any one of claims 1 to 4, wherein the region containing a Group III element and a Group V element at a non-stoichiometric atomic ratio has a thickness of 1 to 10 nm from the top surface of the p-type layer in a depth direction.

6. A gallium nitride-based semiconductor device according to any one of claims 1 to 5, wherein the top portion of the p-type layer has a surface having Ga deposited thereon.

7. A gallium nitride-based semiconductor device according to any one of claims 1 to 6, wherein the p-type layer has a surface having joined thereto a gallium nitride semiconductor material containing a Group III element and a Group V element at a non-stoichiometric atomic ratio.

8. A gallium nitride-based semiconductor device according to claim 7, wherein the gallium nitride semiconductor material is boron phosphide (BP) having a non-stoichiometric atomic ratio.